Name:_____ Date:_____

A2CC: The Discriminant

Do now:

For each of the following:

(a) Find roots (solve), using the **quadratic formula.**

(b) Make a sketch of the graph, using your graphing calculator.

(c) Describe the roots using the following descriptions: (a) real, rational, unequal
(b) imaginary
(c) real, rational, equal
(d) real, irrational, unequal

1. $y = x^2 - 6x + 9$

2. $y = x^2 - 2x - 24$

3. $y = x^2 + 4x + 1$

4. $y = x^2 + 2x + 6$

$b^2 - 4ac$ is called the discriminant, d, of the equation. You can determine the nature of the roots from the discriminant.

Value of discriminant	Description of roots	Description of graph (include number of x intercepts)
$d = 0$		
$d > 0$ and a perfect square		
$d > 0$ and not a perfect square		
$d < 0$		

When the discriminant > 0, the equation has _____ real solutions.

When the discriminant < 0, the equation has _____ real solutions.

When the discriminant = 0, the equation has _____ real solutions.

Classwork:

In 1-10, find the value of the discriminant and describe the nature of the roots.

1. $x^2 - 4x + 8 = 0$
2. $x^2 - 15x + 36 = 0$
3. $3x^2 - 8x + 7 = 0$
4. $\frac{1}{4}x^2 - 6x + 36 = 0$
5. $12 - 3x^2 = 4x$
6. $x^2 + \sqrt{12}x + 3 = 0$
7. $2x^2 = 5$
8. $\frac{3}{x} - 4 = x$
9. $(x+5)(x-5) = 10x$
10. $\frac{x-2}{3} = \frac{4}{x}$

11. Which parabola touches the x- axis at one point?

(1) $y = x^2 + 8x + 16$ (2) $y = x^2 - 5x + 6$

(3) $y = x^2 - 16$ (4) $y = x^2 + 4$

12. Which parabola does not have an x- intercept?

(1) $y = x^2 + 3x + 1$ (2) $y = x^2 + x + 3$

(3) $y = x^2 + 3x - 1$ (4) $y = x^2 + x - 3$

13. Which parabola intersects the x-axis in two distinct points?

(1) $y = (x+5)^2$ (2) $y = (x-5)^2$

(3) $y = x^2 - 25$ (4) $y = x^2 + 25$

14. Given the equation $ax^2 + bx + c = 0$. If $b^2 < 4ac$, then the roots of the equation must be

(1) real and irrational (2) real and rational
(3) equal (4) imaginary

15. Find the smallest integral value of c for which the roots of $x^2 - 6x + c = 0$ are imaginary.

16. Find the largest integral value of c for which the roots of $2x^2 - 8x + c = 0$ are real.

17. For what value of c will the roots of the equation $x^2 + 6x + c = 0$ be equal?

18. For what value(s) of k, will the roots of the equation $x^2 - 2kx + 16 = 0$ be real, rational, and equal.

19. What is the positive value of m in the equation $4x^2 + mx + 9 = 0$ that makes the roots of the equation real, equal, and rational?

20. For what value of c will the roots of the equation $x^2 + 4x + c = 0$ be real, rational, and equal?

21. If the roots of a quadratic equation are real, rational, and equal, the discriminant of the equation has a value that is

    (1) less than zero
    (2) equal to zero
    (3) greater than zero and a perfect square
    (4) greater than zero but not a perfect square